

CLAIMS

1. A tube blank correcting member for use in fabricating a heat exchanger comprising a pair of headers arranged in parallel and spaced apart from each other, a plurality of flat heat exchange tubes arranged in parallel between the headers and
5 brazed at opposite ends to the respective headers with the tube ends placed into respective insertion holes formed in the headers, and fins each arranged between and brazed to each pair of adjacent heat exchange tubes, the blank correcting
10 member being adapted for use in temporarily assembling the headers, flat heat exchange tube blanks and the fins into a unit to be brazed, the blank correcting member extending from front rearward and having a plurality of blank fitting slits formed in a side edge thereof and arranged from the front
15 rearward at the same spacing as the heat exchange tubes to be produced of the heat exchanger.

2. A tube blank correcting member for use in temporarily assembling a heat exchanger according to claim 1 wherein each of the blank fitting slits has an opening with a width larger
20 than the maximum thickness of the flat heat exchange tube blank, and an open end portion of the slit flares toward the opening with a gradually increasing width.

3. A tube blank correcting member for use in temporarily assembling a heat exchanger according to claim 1 wherein an
25 open end portion of each of the blank fitting slits flares toward an opening with a gradually increasing width to provide a tapering portion, and the tapering portion has a taper angle of 10 to 20 deg.

4. A tube blank correcting member for use in temporarily assembling a heat exchanger according to claim 3 wherein the blank fitting slit has a portion other than the tapering portion and having a depth not smaller than the width of the tube blank.

5 5. A heat exchanger temporarily assembling apparatus for use in fabricating a heat exchanger comprising a pair of headers arranged in parallel and spaced apart from each other, a plurality of flat heat exchange tubes arranged in parallel between the headers and brazed at opposite ends to the
10 respective headers with the tube ends placed into respective insertion holes formed in the headers, and fins each arranged between and brazed to each pair of adjacent heat exchange tubes, the apparatus being adapted for use in temporarily assembling the headers, flat heat exchange tube blanks and
15 the fins into a unit to be brazed,

 the heat exchanger temporarily assembling apparatus comprising a support member for supporting thereon the heat exchanger tube blanks arranged from front rearward in parallel with their lengthwise direction positioned laterally, with
20 their widthwise direction positioned vertically, and with opposite left and right ends thereof aligned respectively, and the fins arranged between the respective pairs of adjacent tube blanks, two header supports arranged respectively at left and right sides of the support member and movable leftward
25 or rightward, and a pair of left and right tube blank correcting members each extending from the front rearward and having a plurality of blank fitting slits formed in a side edge thereof and arranged from the front rearward at the same spacing

as the heat exchange tubes to be produced of the heat exchanger, each of the tube blank correcting members being movable between a correcting position wherein the corresponding ends of all the tube blanks as supported on the support member are fitted
5 into the respective slits and a noncorrecting position wherein the tube blanks are not fitted into the slits.

6. A heat exchanger temporarily assembling apparatus according to claim 5 wherein each of the blank fitting slits has an opening with a width larger than the maximum thickness
10 of the flat heat exchange tube blank, and an open end portion of the slit flares toward the opening with a gradually increasing width.

7. A heat exchanger temporarily assembling apparatus according to claim 5 wherein an open end portion of each of
15 the blank fitting slits flares toward an opening with a gradually increasing width to provide a tapering portion, and the tapering portion has a taper angle of 10 to 20 deg.

8. A heat exchanger temporarily assembling apparatus according to claim 7 wherein the blank fitting slit has a portion
20 other than the tapering portion and having a depth not smaller than the width of the tube blank.

9. A heat exchanger temporarily assembling apparatus according to claim 5 wherein when in the correcting position, the tube blank correcting member is movable laterally.

25 10. A heat exchanger temporarily assembling apparatus according to claim 5 wherein when in the correcting position, the tube blank correcting member is biased laterally outward by a biasing member.

11. A heat exchanger temporarily assembling apparatus according to claim 5 wherein each of the tube blank correcting members is provided on a tube blank holding member extending from the front rearward, and the tube blank holding member
5 is movable between a first position wherein the holding member is placed on corresponding left or right end portions of all the heat exchange tube blanks supported on the support member and a second position where the holding member is away from all the heat exchange tube blanks, the tube blank correcting
10 member being movable upward or downward relative to the holding member when the holding member is in the first position, the blank correcting member assuming the correcting position when moved downward or assuming the noncorrecting position when moved upward.

15 12. A heat exchanger temporarily assembling apparatus according to claim 11 wherein the tube blank holding member is disposed laterally outwardly of the corresponding header support and fixed to a free end of an arm attached to a horizontal rod extending from the front rearward and pivotally movable
20 about an axis of the rod, and the holding member is movable between the first position and the second position by the pivotal movement of the arm.

13. In fabricating a heat exchanger comprising a pair of headers arranged in parallel and spaced apart from each
25 other, a plurality of flat heat exchange tubes arranged in parallel between the headers and brazed at opposite ends to the respective headers with the tube ends placed into respective insertion holes formed in the headers, and fins each arranged

between and brazed to each pair of adjacent heat exchange tubes, each of the heat exchange tubes having a pair of flat walls opposed to each other and two side walls interconnecting the two flat walls respectively at opposite side edges thereof,
5 a heat exchanger temporarily assembling method for use in temporarily assembling the headers, flat heat exchange tube blanks and the fins into a unit to be brazed,

the heat exchanger temporarily assembling method using an apparatus according to any one of claims 5 to 12 and including:

10 causing the support member to support thereon the heat exchange tube blanks arranged from front rearward in parallel with their lengthwise direction positioned laterally, with their widthwise direction positioned vertically, and with opposite left and right ends thereof aligned respectively, and the fins arranged
15 between the respective pairs of adjacent tube blanks,

placing the headers on the respective header supports as spaced apart from each other,

moving each of the tube blank correcting members to the correcting position to place corresponding left or right ends
20 of all the tube blanks on the support member into the respective blank fitting slits, and

moving the two header supports laterally inward to place the opposite ends of the tube blanks into the respective insertion holes of the headers.

25 14. A heat exchanger temporarily assembling method according to claim 13 wherein each of the heat exchange tube blanks is produced from a metal plate having two first portions for making the flat walls, a second portion interconnecting

the first portions for forming one of the side walls, and two third portions projecting from the respective first portions integrally therewith each at a side edge thereof opposite to the second portion for making the other side wall, by bending
5 the metal plate to the shape of a hairpin at the second portion to place the third portions end to end.

15 15. A heat exchanger temporarily assembling method according to claim 14 wherein the metal plate is formed from an aluminum brazing sheet having a brazing material layer providing opposite surfaces thereof by rolling the sheet.

16. A process for fabricating a heat exchanger characterized in that the headers, the heat exchange tube blanks and the fins temporarily assembled by a method according to any one of claims 13 to 15 are brazed.

15 17. A heat exchanger fabricated by brazing the headers, the heat exchange tube blanks and the fins temporarily assembled by a method according to any one of claims 13 to 15.

20 18. A vehicle comprising a refrigeration cycle having a compressor, a condenser and an evaporator, the condenser being a heat exchanger according to claim 17.